measurements demonstrated that rats with CHF had decreased LVSP, elevated LVEDP and reduced LVdP/dt compared to SHAM ($p < 0.05$). Before L-NAME administration, MCFP in CHF was significantly greater compared to SHAM ($p < 0.01$). L-NAME dose-dependently increased mean arterial pressure and decreased heart rate in both SHAM and CHF rats. After L-NAME administration, MCFP was increased in both groups ($p < 0.01$) (from 8.7 ± 0.5 to 9.3 ± 0.7 mmHg in CHF; from 6.8 ± 0.4 to 7.9 ± 0.6 mmHg in SHAM). Changes in MCFP following L-NAME was significantly decreased in CHF (+6.9 ± 1.0% from control levels) when compared to SHAM (+15.8 ± 1.3%). These results indicate that NO mediated regulation of venous tone could be impaired in a rat model of CHF.

1084-138 Plasma Adenosine Levels Increase In Patients with Congestive Heart Failure

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Adenosine is known to be cardioprotective via adenosine A1 and A2 receptors against cardiovascular impairment. We examined whether the plasma adenosine levels are increased or decreased in patients with heart failure. seventy-six patients (mean 52 ± 2 years old, ranging 25–81) attending the specialists of heart failure clinic over 6 months were divided according to the cause of heart failure (40 patients with ischemic heart diseases, and 36 patients with congestive heart failure due to vascular heart diseases (12 patients with mitral regurgitation, and 5 patients with aortic regurgitation), hypertrophic obstructive cardiomyopathy (5 patients), and dilated cardiomyopathy (14 patients). Controls were 24 healthy laboratory staff members (mean 38 ± 2 years old, ranging 25–56). The plasma adenosine levels increased according to the NYHA classification (I = 99 ± 11, II = 166 ± 15, III = 343 ± 35, IV = 298 ± 57 vs. 73 ± 10 (healthy subjects) nmol/L). Although ejection fraction (NYHA I = 71 ± 2, NYHA II = 64 ± 4, NYHA III = 37 ± 3, NYHA IV = 23 ± 6%) decreased in patients with heart failure, there was no direct correlation ($r = 0.161$, NS) between EF and the plasma adenosine levels in the patients with heart failure. There were no significant differences in the plasma adenosine levels in the patients with ischemic and non-ischemic heart failure (219 ± 30 and 211 ± 23 nmol/L). The plasma norepinephrine levels were also increased according to NYHA classification (NYHA I = 118 ± 15, NYHA II = 337 ± 26, NYHA III = 684 ± 45, NYHA IV = 1232 ± 117 vs. 84 ± 7 (healthy subjects) pg/ml). There was a correlation ($r = 0.414$, $P < 0.05$) between the plasma adenosine and norepinephrine levels in the patients with heart failure. Plasma adenosine levels were independent of drugs used in heart failure (i.e., diuretics ($p = 0.91$), digitalis ($p = 0.08$), beta-blockers ($p = 0.42$), Ca blockers ($p = 0.18$), isosorbide dinitrates ($p = 0.26$) and ACE inhibitors ($p = 0.19$)). We conclude that the plasma adenosine levels increase in patients with ischemic and non-ischemic heart failure, and that the extents of increases in adenosine levels correlate well with the severity of heart failure. Increased plasma adenosine levels may be endogenous compensatory mechanisms for the failing heart.

1084-139 Increased Plasma Nitrate Concentration in Heart Failure is Due to Decreased Renal Nitrate Clearance

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Despite evidence of attenuated endothelium-dependent, nitric oxide-mediated vasodilation in patients with congestive heart failure (CHF), plasma concentration of nitrate (NO_3), the stable metabolite of nitric oxide, has been reported to be increased in patients with CHF when compared with that of normal subjects. Whether increased plasma NO_3 concentration in CHF is due to increased endothelial nitric oxide production or reduced renal clearance of nitrates is unknown. Accordingly, renal NO_3 clearance (ml/min) was determined in 8 patients with Class III CHF (mean age 51, mean EF 26%) and 5 normal subjects (mean age 45 years) by measuring 24-hour urine volume (ml), and urine and plasma NO_3 concentrations (μM) with a nitric oxide chemiluminescence analyzer (Sievers Model 270B). Results were as follows:

	24 hr. Urine Volume	Plasma NO_3 (μM)	Urine NO_3 (μM)	Renal NO_3 Clearance
Normals	1910	10.6	419	59
CHF	1904	31.5*	172*	13*

*indicates $p < 0.05$ vs. normals

Creatinine clearance was also decreased in CHF when compared with normals (63 vs. 133 ml/min, $p < 0.05$). Plasma nitrate concentration correlated with both nitrate clearance and creatinine clearance ($r = 0.60$ and 0.65, both $p < 0.05$). *In conclusion,* these data confirm the previous report of increased plasma NO_3 concentration in CHF and further demonstrate that 24-hour urinary NO_3 excretion and renal NO_3 clearance are markedly decreased in CHF. These data suggest that increased plasma NO_3 in CHF is due to decreased renal NO_3 clearance rather than increased endothelial nitric oxide production.

1084-140 Effects of Nasal Oxygen on Muscle Sympathetic Activity in Patients with Congestive Heart Failure

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In patients with congestive heart failure activation (CHF) of sympathetic nervous system occurs and importantly influences prognosis. We recently observed an improvement of exercise capacity following the treatment of Cheyne-Stokes respiration (CSR) with nasal oxygen in patients with CHF and attributed this to the reduction of CSR and oxygen desaturations with concomitant reduction in sympathetic activity. We therefore investigated the effects of nasal oxygen (4 L/min over 20 min) on muscle sympathetic nerve activity (MSA) at rest and during a voluntary apnea in patients with chronic CHF. In 6 patients (age 5 ± 9 years; ejection fraction 22 ± 4%) MSA was measured using microneurography of the peroneal nerve. Resting MSA was higher in CHF patients compared healthy controls ($n = 21$, age: 27 ± 16 years; 72 ± 15 vs 41 ± 21 bursts/100 heartbeats; $p < 0.01$). In CHF patients resting MSA was not influenced by oxygen administration (72 ± 16 bursts/100 heartbeats; n.s.), but arterial oxygen saturation increased from 93 ± 3% to 98 ± 1% ($p < 0.01$) and heart rate decreased from 91 ± 15 to 88 ± 17 beats/min ($p < 0.05$), but blood pressure was unaffected. The duration of apnea was longer in healthy volunteers compared to CHF patients (40 ± 9 vs 23 ± 6 sec, $p < 0.001$), but it increased during oxygen administration to 32 ± 7 sec in CHF patients ($p < 0.05$). Exposed to room air, the increase in MSA during apnea was comparable in CHF patients and healthy volunteers (13 ± 9 vs 15 ± 8 bursts/100 heartbeats; n.s.). In CHF patients, the increase in MSA during apnea was attenuated by oxygen (13 ± 9 vs 2 ± 17 bursts/100 heartbeats; $p < 0.05$), whereas changes in blood pressure and heart rate were unaffected.

Thus, oxygen administration attenuates the increase in MSA during apnea in patients with CHF. As repetitive apnea episodes during Cheyne-Stokes respiration in CHF patients could be of pathophysiologic relevance, in particular for prognosis, longterm effects of oxygen administration should be further tested.

1084-141 Baroreceptors and Beta-Blockers in Heart Failure

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Autonomic imbalance and depression of baroreceptor function relate to prognosis and risk of sudden death in heart failure (HF). It is not known to what extent treatment with β-blockers (BB) improve these aspects and if there are differences between BBs. We assessed baroreceptor gain noninvasively by spectral analysis of RR and systolic blood pressure intervals (256–512) and respiratory signal recorded at rest, supine and standing with spontaneous and controlled respiration using the cross-spectral method when coherence was > 0.5 (α-angle). Patients received either hydrophilic celiprolol (C) 200 mg daily ($n = 21$), lipophilic metoprolol (M) 50 mg B.D. ($n = 19$) or placebo ($n = 10$) for 12 weeks after a 4 week dose titration period.

Results: Baroreceptor gain was significantly depressed in patients compared to a control group (4.95 ± 0.55; normal 11.73 ± 1.32 msec/mmHg; $p < 0.0001$). After treatment with M baroreceptor gain improved from 4.5 ± 1.05 to 9.06 ± 1.6 msec/mmHg ($p = 0.006$) and the effect was apparent after 4 weeks treatment. In contrast the changes in baroreceptor gain after treatment with C (4.97 ± 1.12 to 6.13 ± 1.17 msec/mmHg) or placebo (6.52 ± 1.55 to 5.47 ± 1.54 msec/mmHg) were not significant. Thus M has a superior effect on restoring baroreceptor gain towards normal which may be due to a direct central effect of M which is absent with hydrophilic BBs such as C.

1084-142 Diastolic Dysfunction Predicts Abnormal Baroreflex Sensitivity in Heart Failure

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Abnormal baroreflex sensitivity (BRS) has been documented in chronic heart failure (CHF) patients (pts), however its clinical relevance has still to be clarified. The relationship between left ventricular (LV) dysfunction, clinical impairment and BRS was investigated in 138 consecutive CHF pts with